# LOWPT RESULTS: 12.7 FB-1

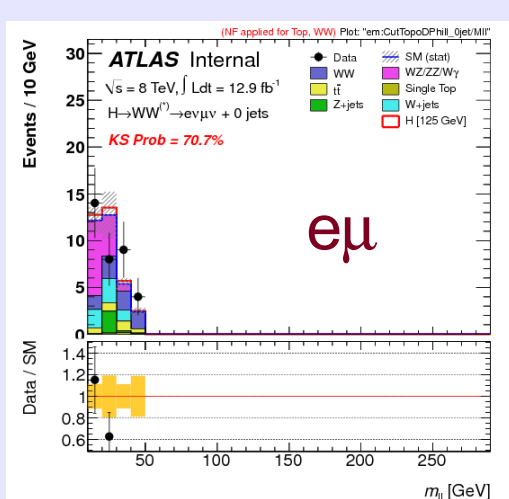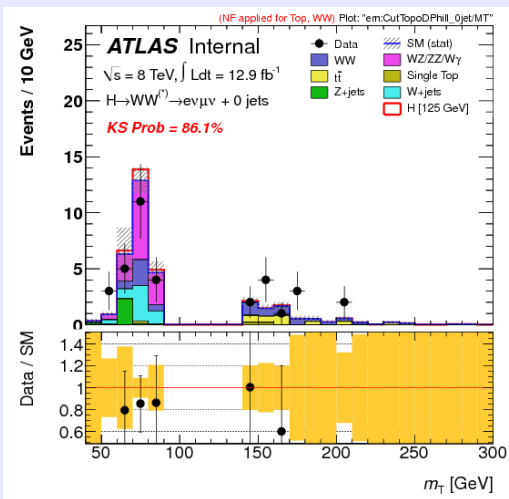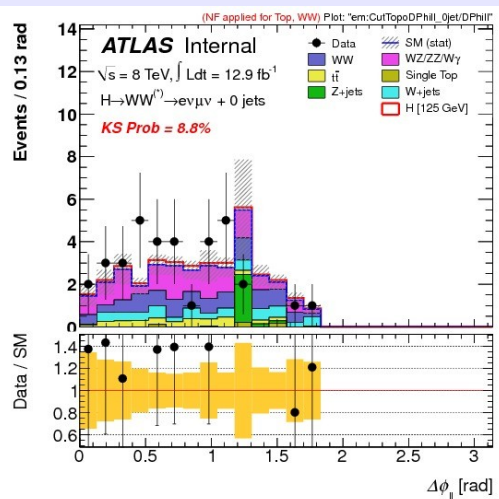Lina Galtieri  for the lowpT Group

For Njet = 0 will show:

Blinded cutflows and plots for events with a Sublead lepton
  in  the  $P_T$ = 10-15 GeV range

Blinded Signal Region  and  WW Control Region distributions
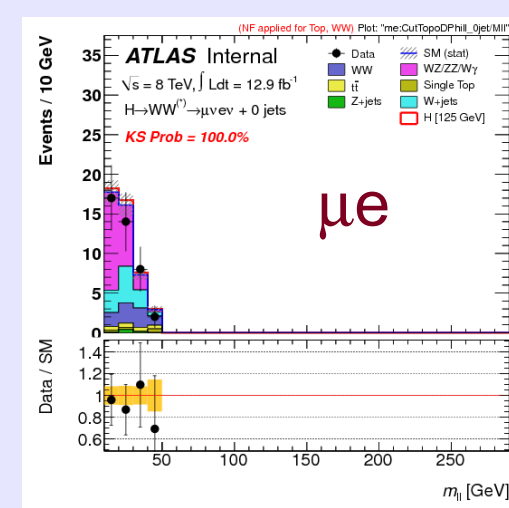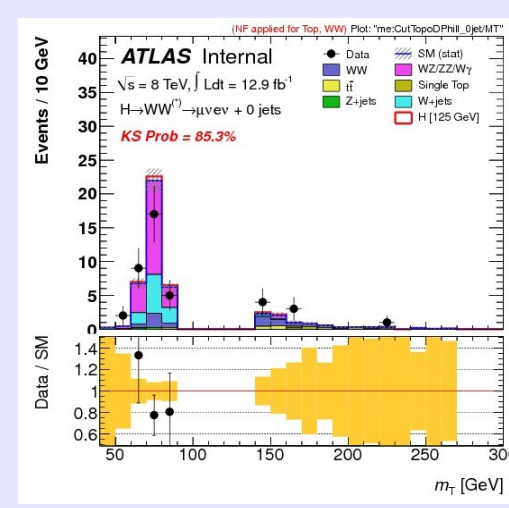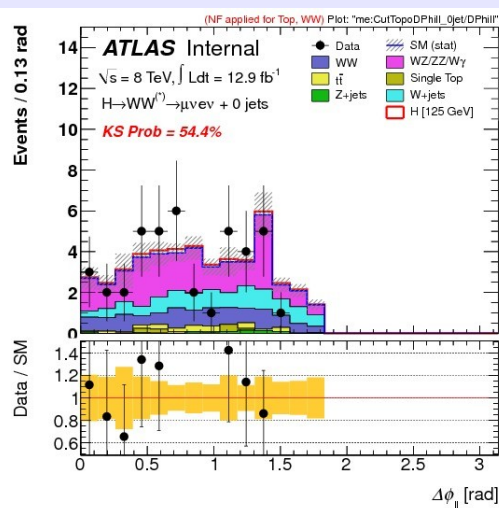
# $\Delta\Phi_{ll}$ , $M_T$ , $M_{ll}$  in blinded SR

## Blinded Signal region (Dphill<1.8) eµ (top), µe (bottom)
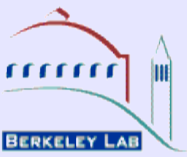


Expect   32
Observe 35
R=1.07± 0.21

eµ

µe

Expect    44
Observe  41
R=0.93±0.15

## No Excess is observed

# CUTFLOW  eμ, μe,  eμ+eμ

## LOWPT 2012 DATA 12.7fb⁻¹ CutWWCR80          (eμ)

| | Signal [125 GeV] | WW | WZ/ZZ/Wγ | $t\bar{t}$ | Single Top | Z+jets | W+jets | Total Bkg. | Observed | Data/MC |
|---|---|---|---|---|---|---|---|---|---|---|
| blinding | 138.47 ± 1.15 | 3258.67 ± 10.51 | 1352.02 ± 14.27 | 17720.87 ± 49.05 | 1794.17 ± 20.65 | 11398.36 ± 51.26 | 2523.02 ± 17.05 | 38047.11 ± 77.87 | 38066 | 1.00 ± 0.01 |
| lepton $p_T$ | 21.04 ± 0.41 | 159.02 ± 2.32 | 235.64 ± 5.71 | 937.46 ± 11.27 | 92.13 ± 4.80 | 2282.45 ± 21.63 | 817.95 ± 7.05 | 4524.66 ± 26.57 | 4246 | 0.94 ± 0.02 |
| OS leptons | 20.61 ± 0.39 | 158.29 ± 2.32 | 108.66 ± 3.96 | 934.91 ± 11.26 | 88.93 ± 4.59 | 2249.18 ± 19.93 | 508.76 ± 5.83 | 4048.73 ± 24.50 | 3909 | 0.97 ± 0.02 |
| $m_{\ell\ell} > 12, 10$ GeV | 20.27 ± 0.39 | 157.46 ± 2.31 | 101.44 ± 3.83 | 931.46 ± 11.24 | 88.73 ± 4.58 | 2246.39 ± 19.93 | 501.84 ± 5.79 | 4027.32 ± 24.45 | 3887 | 0.97 ± 0.02 |
| Scale factors | | NF = 0.81 | | | NF = 1.04 | NF = 1.04 | | | | |
| Z veto (for $ee, \mu\mu$) | 20.27 ± 0.39 | 128.07 ± 1.88 | 101.44 ± 3.83 | 964.63 ± 11.64 | 91.89 ± 4.74 | 2246.39 ± 19.93 | 501.84 ± 5.79 | 4034.26 ± 24.63 | 3887 | 0.96 ± 0.02 |
| Scale factors | | NF = 0.81 | | | NF = 1.04 | NF = 1.04 | | | | |
| $E_{T,rel}^{miss} > 45, 25$ GeV | 10.02 ± 0.28 | 72.96 ± 1.42 | 43.06 ± 2.63 | 632.27 ± 9.42 | 64.37 ± 3.93 | 348.09 ± 7.43 | 120.06 ± 2.96 | 1280.81 ± 13.30 | 1161 | 0.91 ± 0.03 |
| Z validation region (incl) | 20.27 ± 0.39 | 157.46 ± 2.31 | 101.44 ± 3.83 | 931.46 ± 11.24 | 88.73 ± 4.58 | 2246.39 ± 19.93 | 501.84 ± 5.79 | 4027.32 ± 24.45 | 3887 | 0.97 ± 0.02 |
| Top validation region (incl) | 1.24 ± 0.11 | 6.57 ± 0.51 | 2.23 ± 0.54 | 539.64 ± 8.56 | 45.13 ± 3.19 | 23.35 ± 1.59 | 20.83 ± 1.69 | 637.76 ± 9.46 | 642 | 1.01 ± 0.04 |
| Scale factors | | NF = 0.81 | | | NF = 0.87 | NF = 0.87 | | | | |
| 0j: jet veto | 5.08 ± 0.20 | 44.39 ± 1.11 | 30.95 ± 2.42 | 9.95 ± 1.07 | 5.60 ± 1.08 | 219.98 ± 6.66 | 70.18 ± 2.00 | 381.06 ± 7.60 | 324 | 0.85 ± 0.05 |
| 0j: $\Delta\phi_{\ell\ell}, MET > 1.57$ | | | | | | | | | | |
| 0j: $p_{T,\ell\ell} > 45, 30$ GeV | 4.05 ± 0.18 | 37.02 ± 1.01 | 23.79 ± 2.09 | 8.63 ± 1.01 | 4.81 ± 1.01 | 20.72 ± 2.81 | 43.70 ± 1.46 | 138.67 ± 4.18 | 145 | 1.05 ± 0.09 |
| 0j: $m_{\ell\ell} < 50$ GeV | 2.99 ± 0.15 | 12.18 ± 0.58 | 16.46 ± 1.74 | 3.50 ± 0.67 | 0.53 ± 0.40 | 12.00 ± 2.56 | 17.10 ± 0.94 | 61.77 ± 3.38 | 62 | 1.00 ± 0.14 |
| 0j: $\Delta\phi_{\ell\ell} < 1.8$ | 1.87 ± 0.13 | 7.72 ± 0.46 | 13.20 ± 1.58 | 3.04 ± 0.62 | 0.32 ± 0.34 | 2.64 ± 2.26 | 5.68 ± 0.57 | 32.60 ± 2.94 | 35 | 1.07 ± 0.21 |
| 0j: $0.75 \cdot m_H < m_T < m_H$ | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0 | nan ± nan |
| 0j: Z validation region | 9.70 ± 0.27 | 99.00 ± 1.84 | 65.73 ± 3.36 | 15.13 ± 1.41 | 7.11 ± 1.33 | 1599.01 ± 18.06 | 282.45 ± 4.23 | 2068.43 ± 19.04 | 2005 | 0.97 ± 0.02 |
| 0j: WW control region | 0.01 ± 0.01 | 12.26 ± 0.65 | 2.60 ± 0.76 | 2.49 ± 0.52 | 2.08 ± 0.60 | 0.34 ± 0.26 | 7.19 ± 0.57 | 26.96 ± 1.43 | 23 | 0.85 ± 0.18 |

## LOWPT 2012 DATA 12.7 fb⁻¹ CutWWCR80          (μe)

| | Signal [125 GeV] | WW | WZ/ZZ/Wγ | $t\bar{t}$ | Single Top | Z+jets | W+jets | Total Bkg. | Observed | Data/MC |
|---|---|---|---|---|---|---|---|---|---|---|
| blinding | 119.01 ± 1.11 | 2965.50 ± 10.01 | 1481.56 ± 15.37 | 15499.90 ± 45.78 | 1584.67 ± 19.47 | 11165.81 ± 61.93 | 1936.12 ± 10.79 | 34633.57 ± 82.24 | 34925 | 1.01 ± 0.01 |
| lepton $p_T$ | 18.44 ± 0.41 | 136.86 ± 2.12 | 393.97 ± 8.35 | 752.47 ± 9.97 | 82.21 ± 4.70 | 2300.32 ± 22.61 | 763.98 ± 5.53 | 4429.81 ± 27.16 | 4418 | 1.00 ± 0.02 |
| OS leptons | 17.85 ± 0.37 | 136.65 ± 2.12 | 167.11 ± 5.28 | 748.99 ± 9.95 | 77.73 ± 4.39 | 2252.36 ± 20.38 | 459.21 ± 4.76 | 3842.06 ± 24.26 | 3956 | 1.03 ± 0.02 |
| $m_{\ell\ell} > 12, 10$ GeV | 17.31 ± 0.37 | 135.52 ± 2.11 | 147.77 ± 4.88 | 745.81 ± 9.93 | 77.73 ± 4.39 | 2250.12 ± 20.37 | 452.32 ± 4.73 | 3809.27 ± 24.16 | 3927 | 1.03 ± 0.02 |
| Scale factors | | NF = 0.81 | | | NF = 1.04 | NF = 1.04 | | | | |
| Z veto (for $ee, \mu\mu$) | 17.31 ± 0.37 | 110.23 ± 1.72 | 147.77 ± 4.88 | 772.38 ± 10.28 | 80.50 ± 4.55 | 2250.12 ± 20.37 | 452.32 ± 4.73 | 3813.30 ± 24.30 | 3927 | 1.03 ± 0.02 |
| Scale factors | | NF = 0.81 | | | NF = 1.04 | NF = 1.04 | | | | |
| $E_{T,rel}^{miss} > 45, 25$ GeV | 8.52 ± 0.26 | 64.00 ± 1.30 | 64.21 ± 3.06 | 501.57 ± 8.23 | 54.98 ± 3.86 | 353.93 ± 8.00 | 154.87 ± 2.16 | 1193.55 ± 12.75 | 1108 | 0.93 ± 0.03 |
| Z validation region (incl) | 17.31 ± 0.37 | 135.52 ± 2.11 | 147.77 ± 4.88 | 745.81 ± 9.93 | 77.73 ± 4.39 | 2250.12 ± 20.37 | 452.32 ± 4.73 | 3809.27 ± 24.16 | 3927 | 1.03 ± 0.02 |
| Top validation region (incl) | 1.00 ± 0.10 | 5.59 ± 0.45 | 2.56 ± 0.45 | 428.92 ± 7.49 | 39.80 ± 3.16 | 21.69 ± 2.98 | 13.17 ± 0.93 | 511.72 ± 8.73 | 545 | 1.07 ± 0.05 |
| Scale factors | | NF = 0.81 | | | NF = 0.87 | NF = 0.87 | | | | |
| 0j: jet veto | 4.40 ± 0.17 | 39.77 ± 1.03 | 48.59 ± 2.84 | 6.50 ± 0.80 | 3.80 ± 1.13 | 230.57 ± 6.79 | 107.33 ± 1.55 | 436.56 ± 7.72 | 379 | 0.87 ± 0.05 |
| 0j: $\Delta\phi_{\ell\ell}, MET > 1.57$ | | | | | | | | | | |
| 0j: $p_{T,\ell\ell} > 45, 30$ GeV | 3.50 ± 0.15 | 32.36 ± 0.93 | 36.89 ± 2.49 | 6.05 ± 0.76 | 2.96 ± 0.98 | 17.97 ± 1.74 | 76.01 ± 1.08 | 172.23 ± 3.58 | 166 | 0.96 ± 0.08 |
| 0j: $m_{\ell\ell} < 50$ GeV | 2.61 ± 0.13 | 11.92 ± 0.57 | 25.72 ± 2.11 | 2.22 ± 0.50 | 1.00 ± 0.40 | 10.24 ± 1.23 | 29.14 ± 0.67 | 80.24 ± 2.67 | 70 | 0.87 ± 0.11 |
| 0j: $\Delta\phi_{\ell\ell} < 1.8$ | 1.54 ± 0.10 | 7.95 ± 0.46 | 22.23 ± 2.00 | 1.97 ± 0.48 | 0.96 ± 0.40 | 0.70 ± 0.21 | 10.17 ± 0.41 | 43.99 ± 2.19 | 41 | 0.93 ± 0.15 |
| 0j: $0.75 \cdot m_H < m_T < m_H$ | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0 | nan ± nan |
| 0j: Z validation region | 8.43 ± 0.24 | 86.69 ± 1.69 | 102.03 ± 4.34 | 10.28 ± 1.07 | 5.62 ± 1.39 | 1647.84 ± 18.68 | 265.83 ± 3.35 | 2118.29 ± 19.62 | 2204 | 1.04 ± 0.02 |
| 0j: WW control region | 0.02 ± 0.02 | 9.59 ± 0.56 | 4.37 ± 0.93 | 1.42 ± 0.36 | 1.38 ± 0.80 | 0.78 ± 0.78 | 16.58 ± 0.46 | 34.12 ± 1.66 | 34 | 1.00 ± 0.18 |

## LOWPT 2012 DATA 12.7fb⁻¹ CutWWCR80          (eμ + μe)

| | Signal [125 GeV] | WW | WZ/ZZ/Wγ | $t\bar{t}$ | Single Top | Z+jets | W+jets | Total Bkg. | Observed | Data/MC |
|---|---|---|---|---|---|---|---|---|---|---|
| blinding | 257.48 ± 1.60 | 6224.17 ± 14.51 | 2833.58 ± 20.97 | 33220.77 ± 67.10 | 3378.85 ± 28.38 | 22564.17 ± 80.39 | 4459.15 ± 20.17 | 72680.68 ± 113.26 | 72991 | 1.00 ± 0.00 |
| lepton $p_T$ | 39.47 ± 0.58 | 295.88 ± 3.14 | 629.61 ± 10.12 | 1689.93 ± 15.05 | 174.34 ± 6.72 | 4582.77 ± 31.29 | 1581.92 ± 8.96 | 8954.46 ± 37.99 | 8664 | 0.97 ± 0.01 |
| OS leptons | 38.46 ± 0.54 | 294.94 ± 3.14 | 275.77 ± 6.60 | 1683.90 ± 15.02 | 166.66 ± 6.35 | 4501.54 ± 28.51 | 967.97 ± 7.53 | 7890.79 ± 34.48 | 7865 | 1.00 ± 0.01 |
| $m_{\ell\ell} > 12, 10$ GeV | 37.57 ± 0.53 | 292.99 ± 3.13 | 249.21 ± 6.20 | 1677.27 ± 15.00 | 166.46 ± 6.35 | 4496.51 ± 28.50 | 954.15 ± 7.48 | 7836.58 ± 34.37 | 7814 | 1.00 ± 0.01 |
| Scale factors | | | | | | | | | | |
| Z veto (for $ee, \mu\mu$) | 37.57 ± 0.53 | 238.30 ± 2.55 | 249.21 ± 6.20 | 1737.01 ± 15.53 | 172.39 ± 6.57 | 4496.51 ± 28.50 | 954.15 ± 7.48 | 7847.56 ± 34.60 | 7814 | 1.00 ± 0.01 |
| Scale factors | | | | | | | | | | |
| $E_{T,rel}^{miss} > 45, 25$ GeV | 18.54 ± 0.38 | 136.96 ± 1.92 | 107.27 ± 4.04 | 1133.84 ± 12.51 | 119.35 ± 5.51 | 702.02 ± 10.92 | 274.93 ± 3.67 | 2474.37 ± 18.43 | 2269 | 0.92 ± 0.02 |
| Z validation region (incl) | 37.57 ± 0.53 | 292.99 ± 3.13 | 249.21 ± 6.20 | 1677.27 ± 15.00 | 166.46 ± 6.35 | 4496.51 ± 28.50 | 954.15 ± 7.48 | 7836.58 ± 34.37 | 7814 | 1.00 ± 0.01 |
| Top validation region (incl) | 2.24 ± 0.14 | 12.16 ± 0.68 | 4.79 ± 0.70 | 968.56 ± 11.37 | 84.93 ± 4.49 | 45.04 ± 3.38 | 34.01 ± 1.93 | 1149.48 ± 12.87 | 1187 | 1.03 ± 0.03 |
| Scale factors | | | | | | | | | | |
| 0j: jet veto | 9.47 ± 0.26 | 84.16 ± 1.51 | 79.54 ± 3.73 | 16.45 ± 1.34 | 9.41 ± 1.57 | 450.55 ± 9.51 | 177.52 ± 2.53 | 817.62 ± 10.83 | 703 | 0.86 ± 0.03 |
| 0j: $\Delta\phi_{\ell\ell}, MET > 1.57$ | | | | | | | | | | |
| 0j: $p_{T,\ell\ell} > 45, 30$ GeV | 7.54 ± 0.23 | 69.38 ± 1.37 | 60.67 ± 3.25 | 14.68 ± 1.27 | 7.77 ± 1.41 | 38.69 ± 3.31 | 119.71 ± 1.82 | 310.89 ± 5.50 | 311 | 1.00 ± 0.06 |
| 0j: $m_{\ell\ell} < 50$ GeV | 5.60 ± 0.20 | 24.10 ± 0.81 | 42.18 ± 2.73 | 5.73 ± 0.84 | 1.53 ± 0.57 | 22.24 ± 2.84 | 46.24 ± 1.15 | 142.01 ± 4.31 | 132 | 0.93 ± 0.09 |
| 0j: $\Delta\phi_{\ell\ell} < 1.8$ | 3.41 ± 0.16 | 15.67 ± 0.65 | 35.44 ± 2.55 | 5.00 ± 0.79 | 1.28 ± 0.53 | 3.34 ± 2.27 | 15.85 ± 0.70 | 76.59 ± 3.67 | 76 | 0.99 ± 0.12 |
| 0j: $0.75 \cdot m_H < m_T < m_H$ | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0 | nan ± nan |
| 0j: Z validation region | 18.13 ± 0.36 | 185.70 ± 2.49 | 167.76 ± 5.49 | 25.41 ± 1.77 | 12.73 ± 1.92 | 3246.84 ± 25.99 | 548.27 ± 5.40 | 4186.72 ± 27.34 | 4209 | 1.01 ± 0.02 |
| 0j: WW control region | 0.03 ± 0.02 | 21.85 ± 0.86 | 6.98 ± 1.20 | 3.91 ± 0.64 | 3.46 ± 1.00 | 1.11 ± 0.82 | 23.77 ± 0.73 | 61.08 ± 2.19 | 57 | 0.93 ± 0.13 |

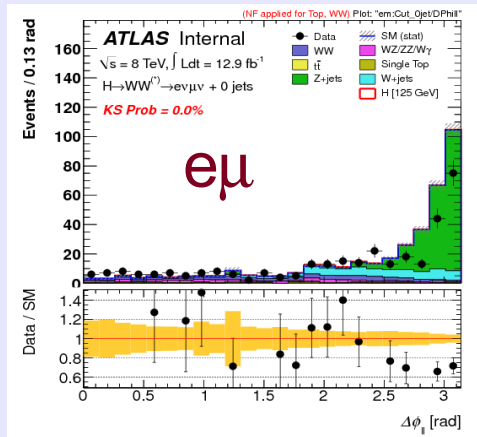Cutflows and plots for lowpT  2012  Analysis.  10/20/12, Lina Galtieri

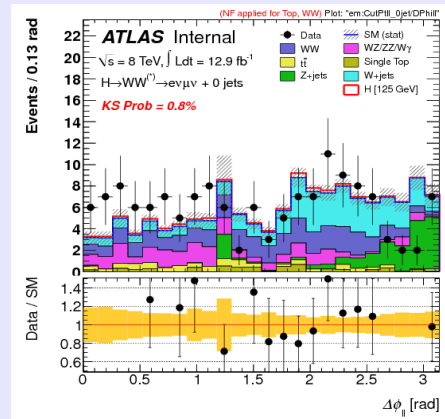# $\Delta\phi_{ll}$ at Jet Veto, after $PT_{ll}$, after $M_{ll}$ cuts

Plots at higher levels of Cutflow to increase statistics.

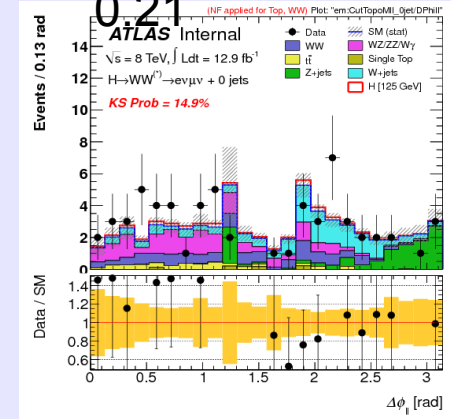Note: **discrepancy at high** $\Delta\phi_{ll}$, $\mu e$ background overestimated

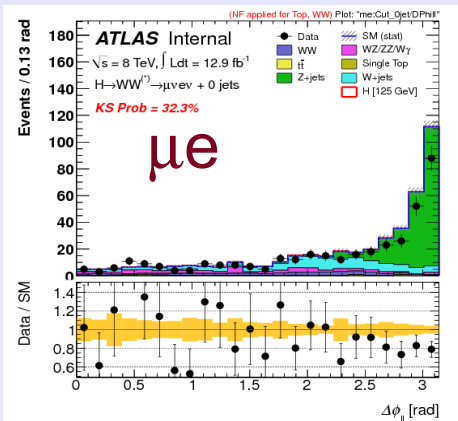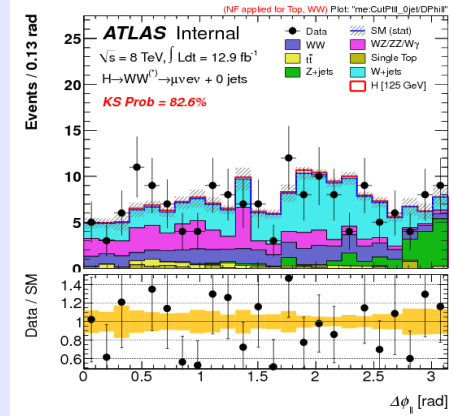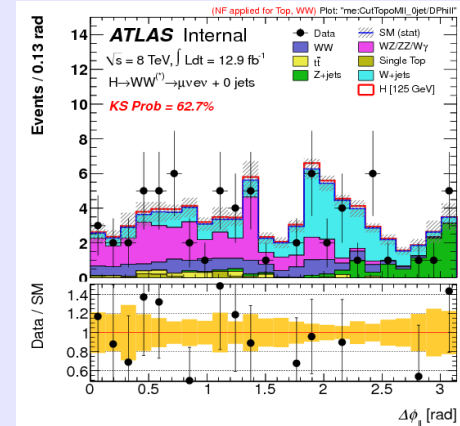# $M_{ll}$ at Jet Veto, after $PT_{ll}$, $M_{ll}$ Cuts

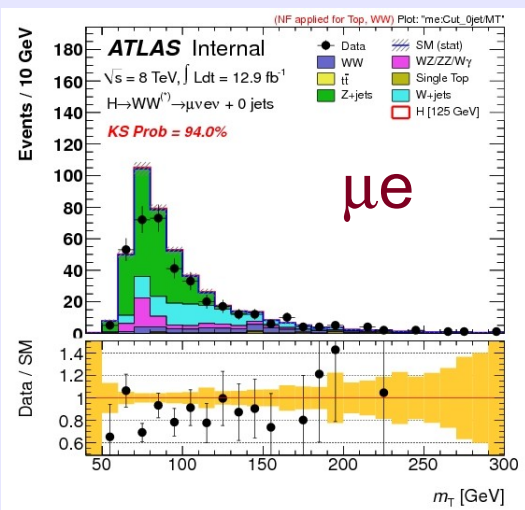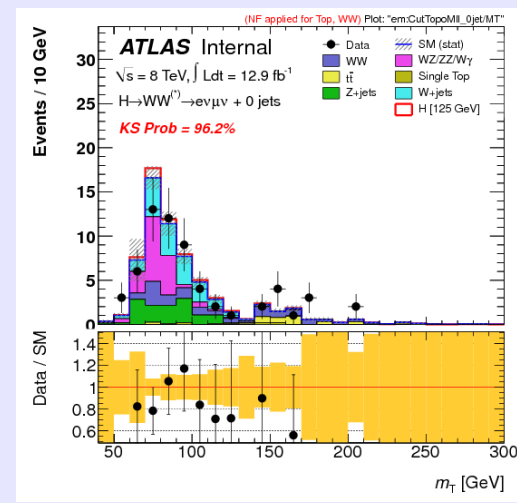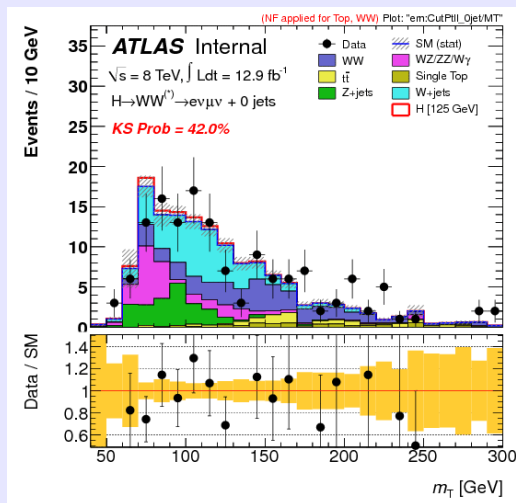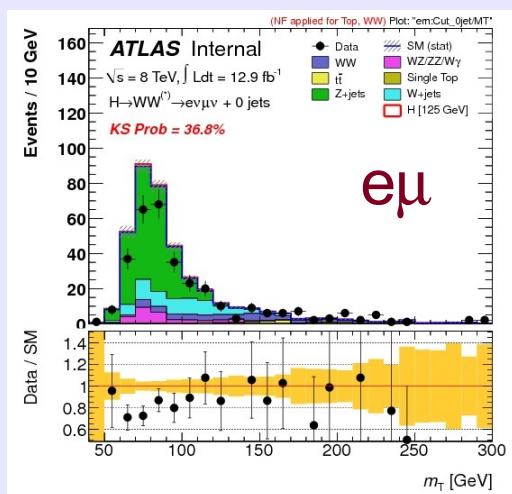## $M_{ll}$ at Jet Veto looks ok for the em, a bit worse for the me!!
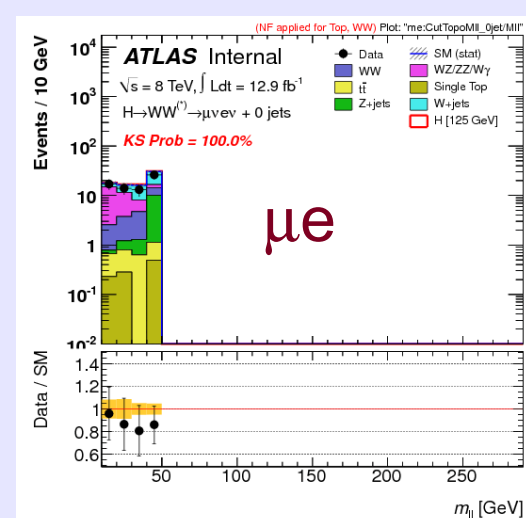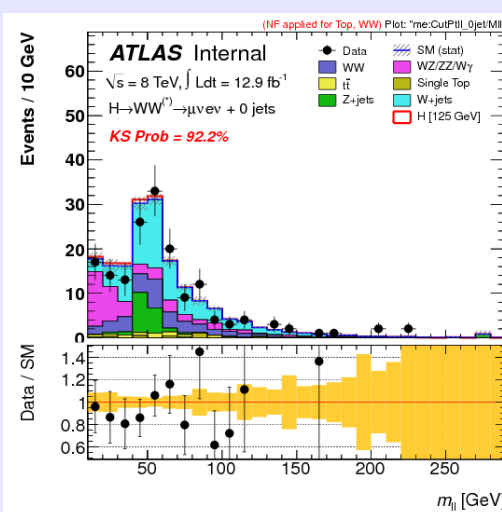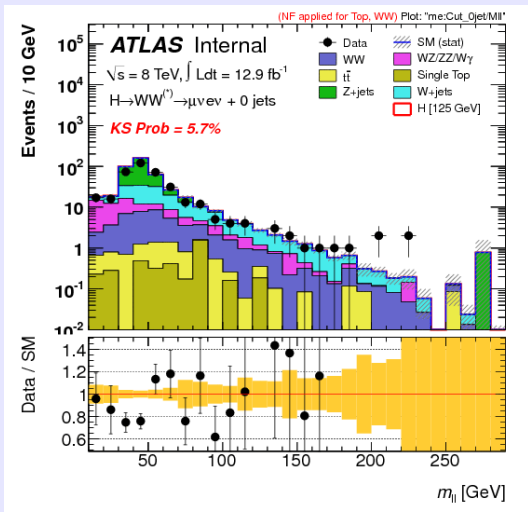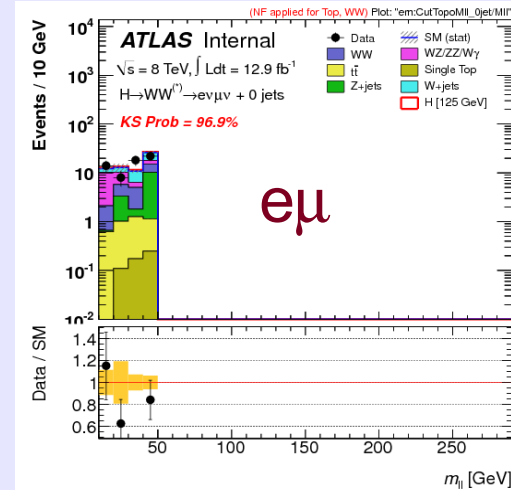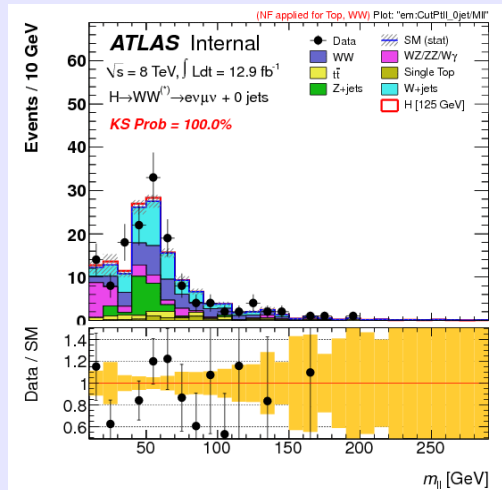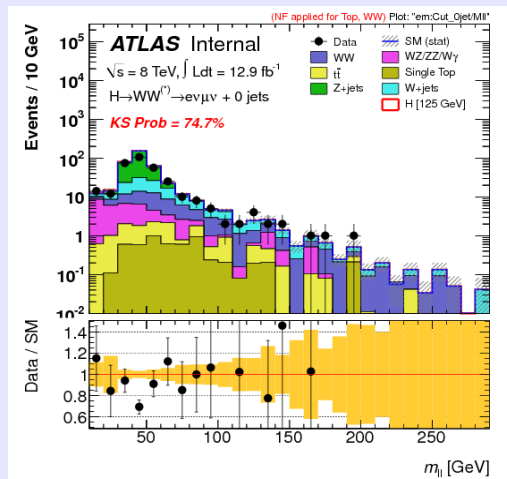
# M$_T$ at jet Veto, after PT$_{ll}$ and M$_{ll}$ cuts

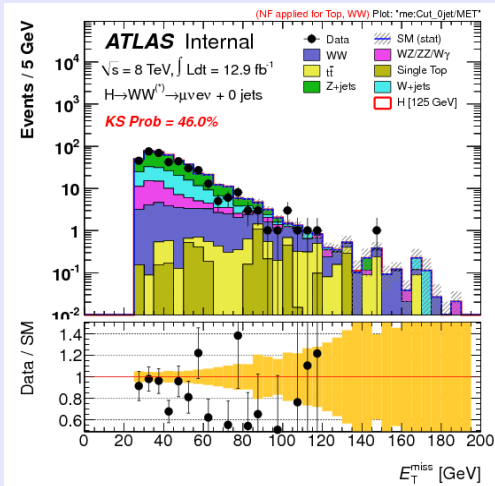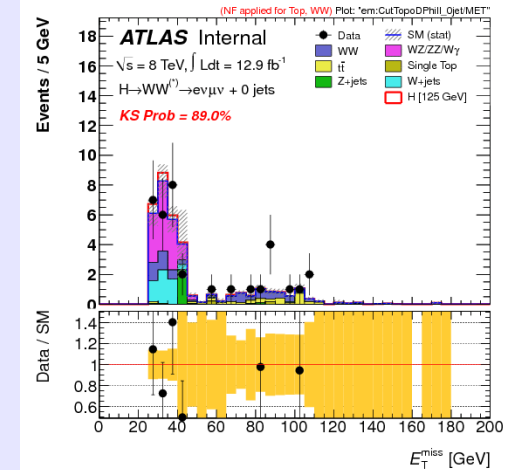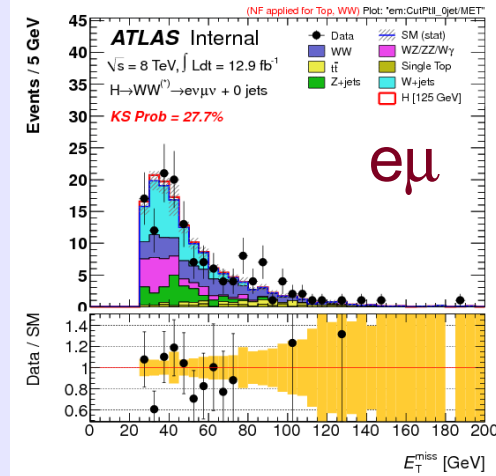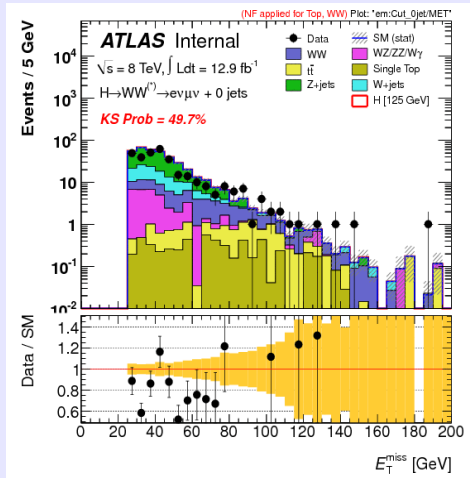Note that M$_T$ at Jet Veto is overpredicted, same as $\Delta\phi_{ll}$ at large $\Delta\phi$
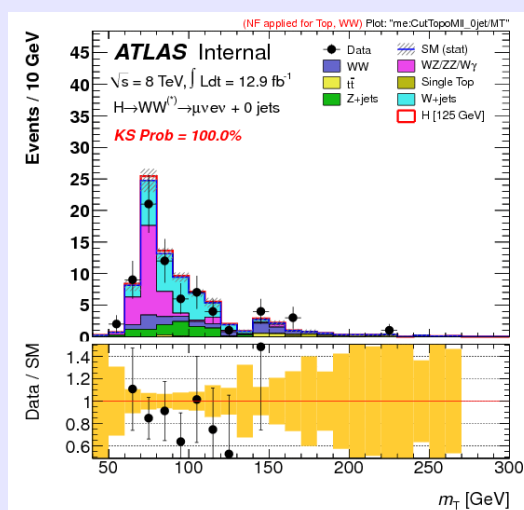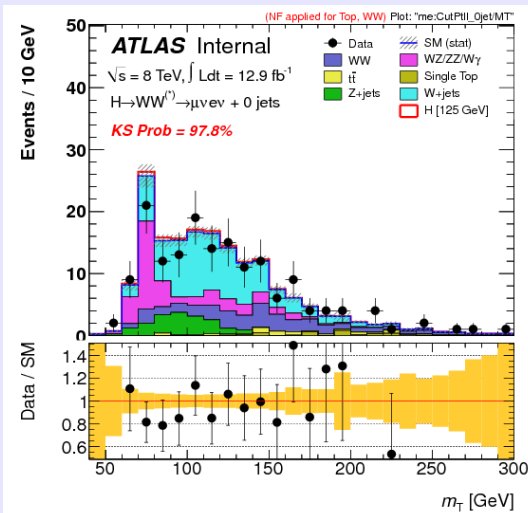
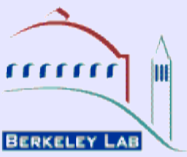# $E_t^{miss}$ at Jet Veto, $PT_{ll}$, $M_{ll}$ Cuts

Some mismodeling in the 50-80 GeV bins
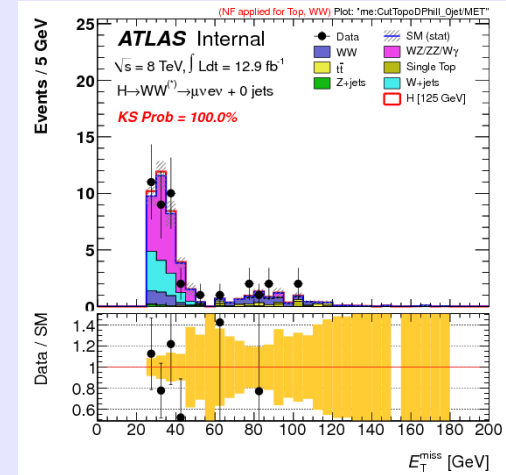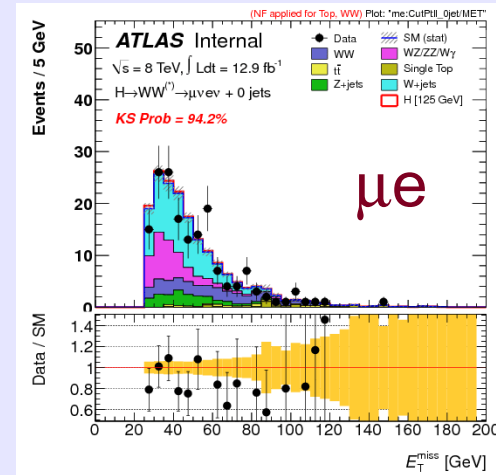
# Try a new CR: $M_{ll} > 50$ GeV

## LOWPT 2012 DATA 12.7fb$^{-1}$ CutWWCR50 ($e\mu$)

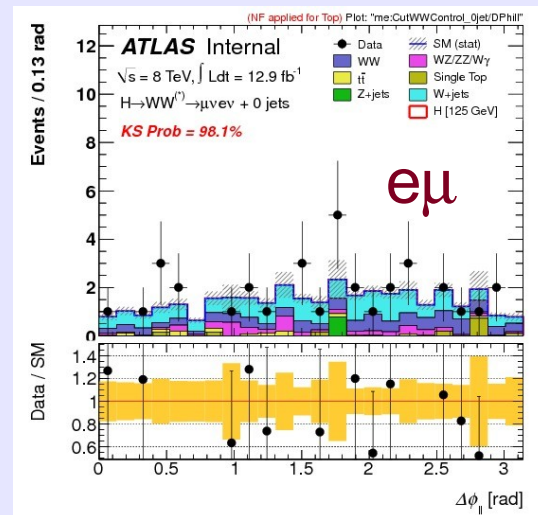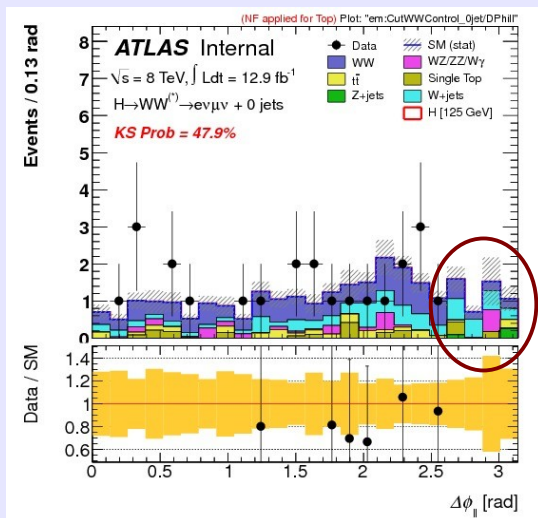| | Signal [125 GeV] | WW | WZ/ZZ/W$\gamma$ | $t\bar{t}$ | Single Top | Z+jets | W+jets | Total Bkg. | Observed | Data/MC |
|---|---|---|---|---|---|---|---|---|---|---|
| blinding | 138.47 ± 1.15 | 3258.67 ± 10.51 | 1352.02 ± 14.27 | 17720.87 ± 49.05 | 1794.17 ± 20.65 | 11398.36 ± 51.26 | 2523.02 ± 17.05 | 38047.11 ± 77.87 | 38066 | 1.00 ± 0.01 |
| lepton $p_T$ | 21.04 ± 0.41 | 159.02 ± 2.32 | 235.64 ± 5.71 | 937.46 ± 11.27 | 92.13 ± 4.80 | 2282.45 ± 21.63 | 817.95 ± 7.05 | 4524.66 ± 26.57 | 4246 | 0.94 ± 0.02 |
| OS leptons | 20.61 ± 0.39 | 158.29 ± 2.32 | 108.66 ± 3.96 | 934.91 ± 11.26 | 88.93 ± 4.59 | 2249.18 ± 19.93 | 508.76 ± 5.83 | 4048.73 ± 24.50 | 3909 | 0.97 ± 0.02 |
| $m_{ll} > 12, 10$ GeV | 20.27 ± 0.39 | 157.46 ± 2.31 | 101.44 ± 3.83 | 931.46 ± 11.24 | 88.73 ± 4.58 | 2246.39 ± 19.93 | 501.84 ± 5.79 | 4027.32 ± 24.45 | 3887 | 0.97 ± 0.02 |
| Scale factors | | NF = 1.00 | | | NF = 1.04 | NF = 1.04 | | | | |
| Z veto (for $ee, \mu\mu$) | 20.27 ± 0.39 | 156.69 ± 2.30 | 101.44 ± 3.83 | 964.63 ± 11.64 | 91.89 ± 4.74 | 2246.39 ± 19.93 | 501.84 ± 5.79 | 4062.88 ± 24.67 | 3887 | 0.96 ± 0.02 |
| Scale factors | | NF = 1.00 | | | NF = 1.04 | NF = 1.04 | | | | |
| $E_{T,rel}^{miss} > 45, 25$ GeV | 10.02 ± 0.28 | 89.26 ± 1.73 | 43.06 ± 2.63 | 632.27 ± 9.42 | 64.37 ± 3.93 | 348.09 ± 7.43 | 120.06 ± 2.96 | 1297.12 ± 13.34 | 1161 | 0.90 ± 0.03 |
| Z validation region (incl) | 20.27 ± 0.39 | 157.46 ± 2.31 | 101.44 ± 3.83 | 931.46 ± 11.24 | 88.73 ± 4.58 | 2246.39 ± 19.93 | 501.84 ± 5.79 | 4027.32 ± 24.45 | 3887 | 0.97 ± 0.02 |
| Top validation region (incl) | 1.24 ± 0.11 | 6.57 ± 0.51 | 2.23 ± 0.54 | 539.64 ± 8.56 | 45.13 ± 3.19 | 23.35 ± 1.59 | 20.83 ± 1.69 | 637.76 ± 9.46 | 642 | 1.01 ± 0.04 |
| Scale factors | | NF = 1.00 | | | NF = 0.87 | NF = 0.87 | | | | |
| 0j: jet veto | 5.08 ± 0.20 | 54.31 ± 1.36 | 30.95 ± 2.42 | 9.95 ± 1.07 | 5.60 ± 1.08 | 219.98 ± 6.66 | 70.18 ± 2.00 | 390.97 ± 7.64 | 324 | 0.83 ± 0.05 |
| 0j: $\Delta\phi_{ll,MET} > 1.57$ | | | | | | | | | | |
| 0j: $p_{T,ll} > 45, 30$ GeV | 4.05 ± 0.18 | 45.29 ± 1.24 | 23.79 ± 2.09 | 8.63 ± 1.01 | 4.81 ± 1.01 | 20.72 ± 2.81 | 43.70 ± 1.46 | 146.94 ± 4.24 | 145 | 0.99 ± 0.09 |
| 0j: $m_{ll} < 50$ GeV | 2.99 ± 0.15 | 14.90 ± 0.71 | 16.46 ± 1.74 | 3.50 ± 0.67 | 0.53 ± 0.40 | 12.00 ± 2.56 | 17.10 ± 0.94 | 64.49 ± 3.40 | 62 | 0.96 ± 0.13 |
| 0j: $\Delta\phi_{ll} < 1.8$ | 1.87 ± 0.13 | 9.44 ± 0.56 | 13.20 ± 1.58 | 3.04 ± 0.62 | 0.32 ± 0.34 | 2.64 ± 2.26 | 5.68 ± 0.57 | 34.32 ± 2.96 | 35 | 1.02 ± 0.19 |
| 0j: $0.75 \cdot m_H < m_T < m_H$ | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0 | nan ± nan |
| 0j: Z validation region | 9.70 ± 0.27 | 99.00 ± 1.84 | 65.73 ± 3.36 | 15.13 ± 1.41 | 7.11 ± 1.33 | 1599.01 ± 18.06 | 282.45 ± 4.23 | 2068.43 ± 19.04 | 2005 | 0.97 ± 0.02 |
| 0j: WW control region | 1.06 ± 0.09 | 30.54 ± 1.02 | 7.33 ± 1.15 | 5.13 ± 0.76 | 4.27 ± 0.93 | 8.72 ± 1.17 | 26.60 ± 1.12 | 82.60 ± 2.54 | 83 | 1.00 ± 0.11 |

## LOWPT 2012 DATA 12.7fb$^{-1}$ CutWWCR50 ($\mu e$)

| | Signal [125 GeV] | WW | WZ/ZZ/W$\gamma$ | $t\bar{t}$ | Single Top | Z+jets | W+jets | Total Bkg. | Observed | Data/MC |
|---|---|---|---|---|---|---|---|---|---|---|
| blinding | 119.01 ± 1.11 | 2965.50 ± 10.01 | 1481.56 ± 15.37 | 15499.90 ± 45.78 | 1584.67 ± 19.47 | 11165.81 ± 61.93 | 1936.12 ± 10.79 | 34633.57 ± 82.24 | 34925 | 1.01 ± 0.01 |
| lepton $p_T$ | 18.44 ± 0.41 | 136.86 ± 2.12 | 393.97 ± 8.35 | 752.47 ± 9.97 | 82.21 ± 4.70 | 2300.32 ± 22.61 | 763.98 ± 5.53 | 4429.81 ± 27.16 | 4418 | 1.00 ± 0.02 |
| OS leptons | 17.85 ± 0.37 | 136.65 ± 2.12 | 167.11 ± 5.28 | 748.99 ± 9.95 | 77.73 ± 4.39 | 2252.36 ± 20.38 | 459.21 ± 4.76 | 3842.06 ± 24.26 | 3956 | 1.03 ± 0.02 |
| $m_{ll} > 12, 10$ GeV | 17.31 ± 0.37 | 135.52 ± 2.11 | 147.77 ± 4.88 | 745.81 ± 9.93 | 77.73 ± 4.39 | 2250.12 ± 20.37 | 452.32 ± 4.73 | 3809.27 ± 24.16 | 3927 | 1.03 ± 0.02 |
| Scale factors | | NF = 1.00 | | | NF = 1.04 | NF = 1.04 | | | | |
| Z veto (for $ee, \mu\mu$) | 17.31 ± 0.37 | 134.86 ± 2.10 | 147.77 ± 4.88 | 772.38 ± 10.28 | 80.50 ± 4.55 | 2250.12 ± 20.37 | 452.32 ± 4.73 | 3837.93 ± 24.33 | 3927 | 1.02 ± 0.02 |
| Scale factors | | NF = 1.00 | | | NF = 1.04 | NF = 1.04 | | | | |
| $E_{T,rel}^{miss} > 45, 25$ GeV | 8.52 ± 0.26 | 78.30 ± 1.60 | 64.21 ± 3.06 | 501.57 ± 8.23 | 54.98 ± 3.86 | 353.93 ± 8.00 | 154.87 ± 2.16 | 1207.85 ± 12.78 | 1108 | 0.92 ± 0.03 |
| Z validation region (incl) | 17.31 ± 0.37 | 135.52 ± 2.11 | 147.77 ± 4.88 | 745.81 ± 9.93 | 77.73 ± 4.39 | 2250.12 ± 20.37 | 452.32 ± 4.73 | 3809.27 ± 24.16 | 3927 | 1.03 ± 0.02 |
| Top validation region (incl) | 1.00 ± 0.10 | 5.59 ± 0.45 | 2.56 ± 0.45 | 428.92 ± 7.49 | 39.80 ± 3.16 | 21.69 ± 2.98 | 13.17 ± 0.93 | 511.72 ± 8.73 | 545 | 1.07 ± 0.05 |
| Scale factors | | NF = 1.00 | | | NF = 0.87 | NF = 0.87 | | | | |
| 0j: jet veto | 4.40 ± 0.17 | 48.65 ± 1.26 | 48.59 ± 2.84 | 6.50 ± 0.80 | 3.80 ± 1.13 | 230.57 ± 6.79 | 107.33 ± 1.55 | 445.45 ± 7.75 | 379 | 0.85 ± 0.05 |
| 0j: $\Delta\phi_{ll,MET} > 1.57$ | | | | | | | | | | |
| 0j: $p_{T,ll} > 45, 30$ GeV | 3.50 ± 0.15 | 39.59 ± 1.13 | 36.89 ± 2.49 | 6.05 ± 0.76 | 2.96 ± 0.98 | 17.97 ± 1.74 | 76.01 ± 1.08 | 179.46 ± 3.63 | 166 | 0.93 ± 0.07 |
| 0j: $m_{ll} < 50$ GeV | 2.61 ± 0.13 | 14.58 ± 0.69 | 25.72 ± 2.11 | 2.22 ± 0.50 | 1.00 ± 0.40 | 10.24 ± 1.23 | 29.14 ± 0.67 | 82.90 ± 2.70 | 70 | 0.84 ± 0.10 |
| 0j: $\Delta\phi_{ll} < 1.8$ | 1.54 ± 0.10 | 9.72 ± 0.56 | 22.23 ± 2.00 | 1.97 ± 0.48 | 0.96 ± 0.40 | 0.70 ± 0.21 | 10.17 ± 0.41 | 45.77 ± 2.22 | 41 | 0.90 ± 0.15 |
| 0j: $0.75 \cdot m_H < m_T < m_H$ | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0 | nan ± nan |
| 0j: Z validation region | 8.43 ± 0.24 | 86.69 ± 1.69 | 102.03 ± 4.34 | 10.28 ± 1.07 | 5.62 ± 1.39 | 1647.84 ± 18.68 | 265.83 ± 3.35 | 2118.29 ± 19.62 | 2204 | 1.04 ± 0.02 |
| 0j: WW control region | 0.89 ± 0.08 | 25.13 ± 0.90 | 11.16 ± 1.32 | 3.82 ± 0.57 | 1.96 ± 0.89 | 7.73 ± 1.23 | 46.87 ± 0.85 | 96.68 ± 2.43 | 96 | 0.99 ± 0.10 |

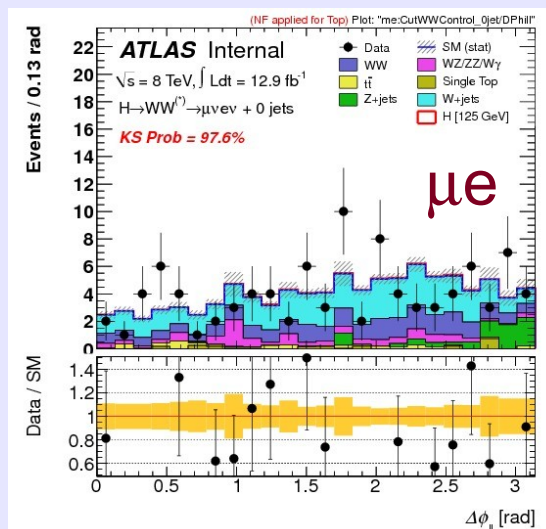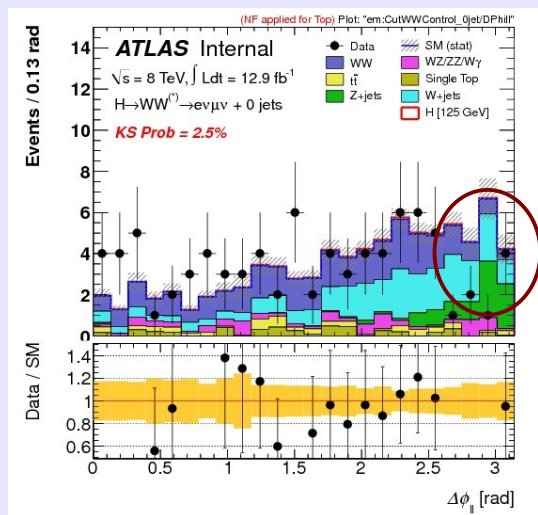Cutflows and plots for lowpT 2012 Analysis. 10/20/12, Lina Galtieri

# WW CR (80,50) : $\Delta\Phi_{ll}$ 0 jet

## Mismodeling at large $\Delta\Phi_{ll}$ in eμ channel in both CR

**M$_{ll}$>80 GeV**

**M$_{ll}$>50 GeV**

**$M_{ll}>80$ GeV**



**$M_{ll}>50$ GeV**



Cutflows and plots for lowpT  2012  Analysis.  10/20/12, Lina Galtieri
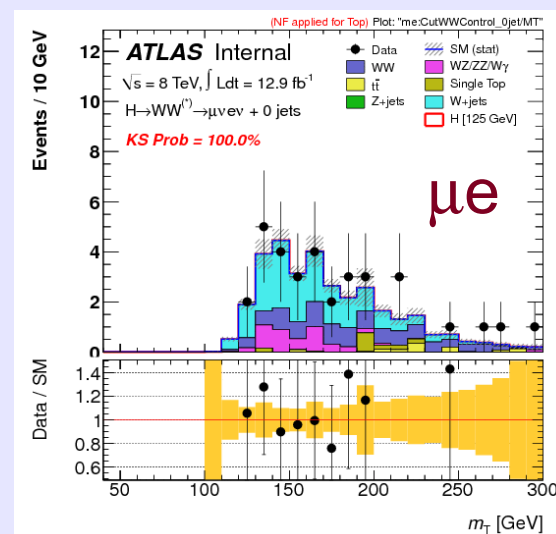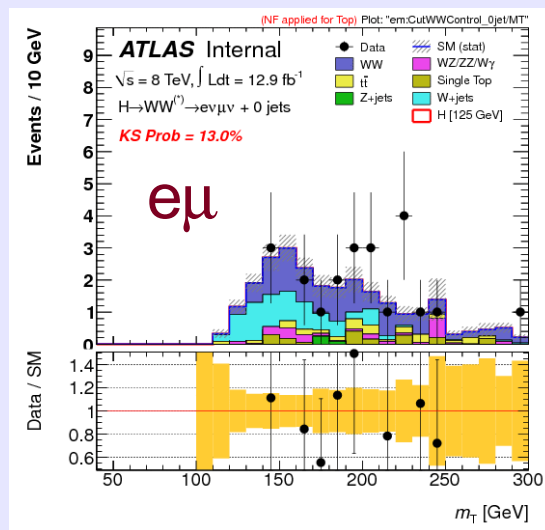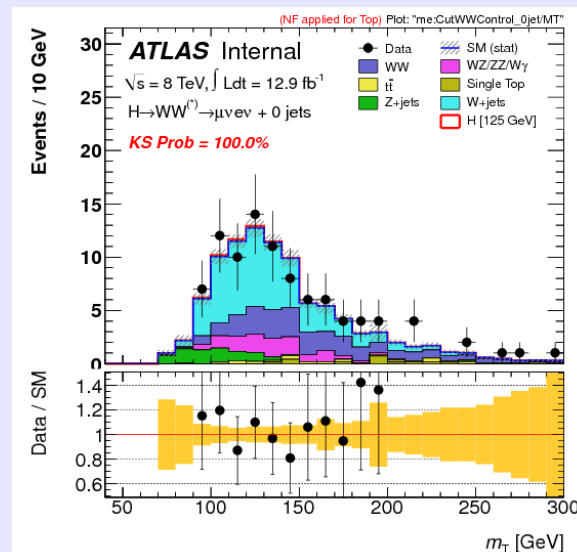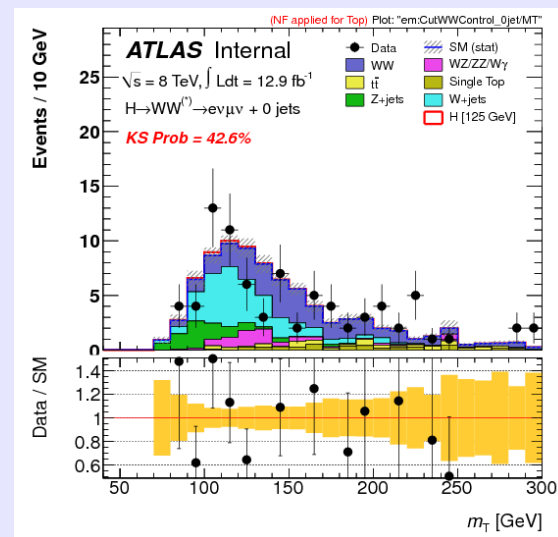
# M$_{ll}$ in CR >80 and >50

**M$_{ll}$>80 GeV**





**M$_{ll}$>50 GeV**





Cutflows and plots for lowpT  2012  Analysis.  10/20/12, Lina Galtieri
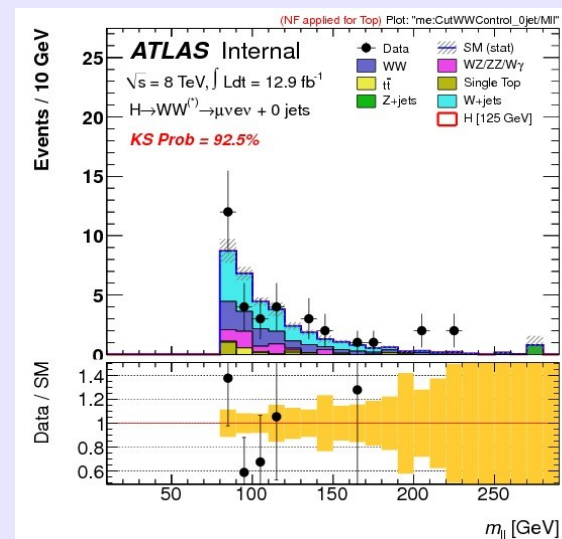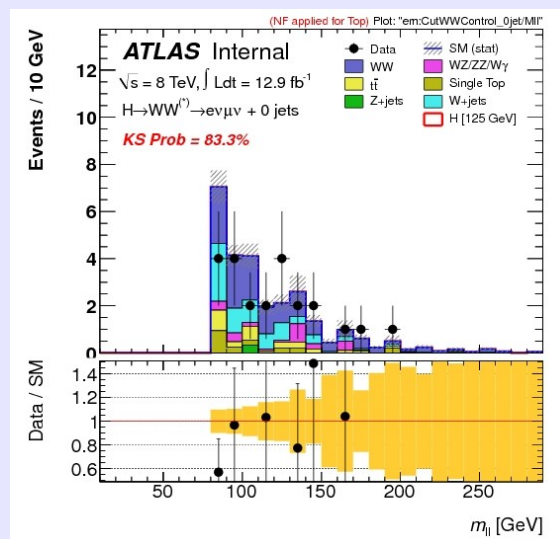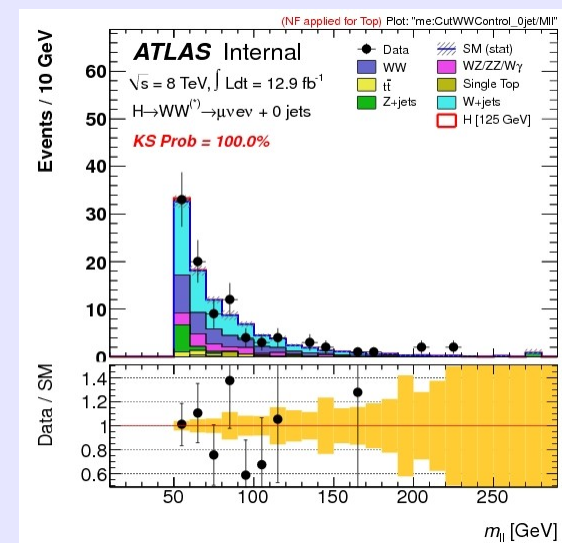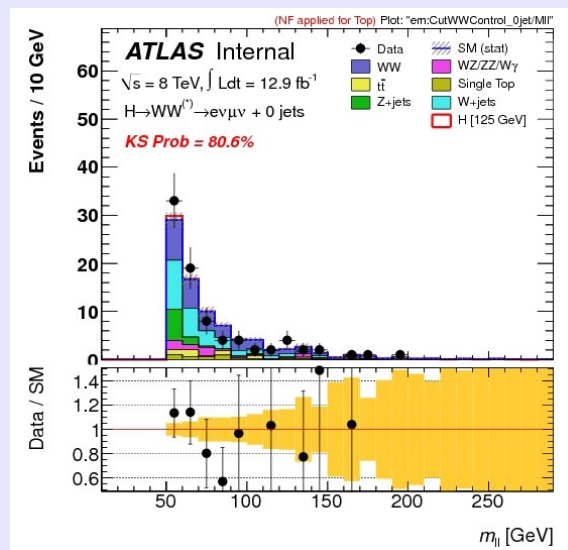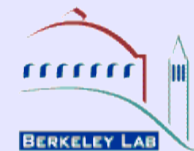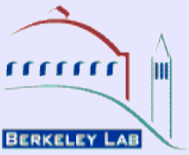
# Conclusions

1. No excess is observed in the eμ channel in the blinded SR (p 2)
2. Data-MC shape distributions disagree in the eμ channel
3. The mismodeling at high $\Delta\Phi_{ll}$ is observed here as well (p 4,9)

4. Two WW Control Regions ($M_{ll} > 80$ or $> 50$) show similar mismodeling of the $\Delta\phi_{ll}$

**LOWPT RESULTS ARE SIMILAR TO THE NOMINAL ANALYSIS**
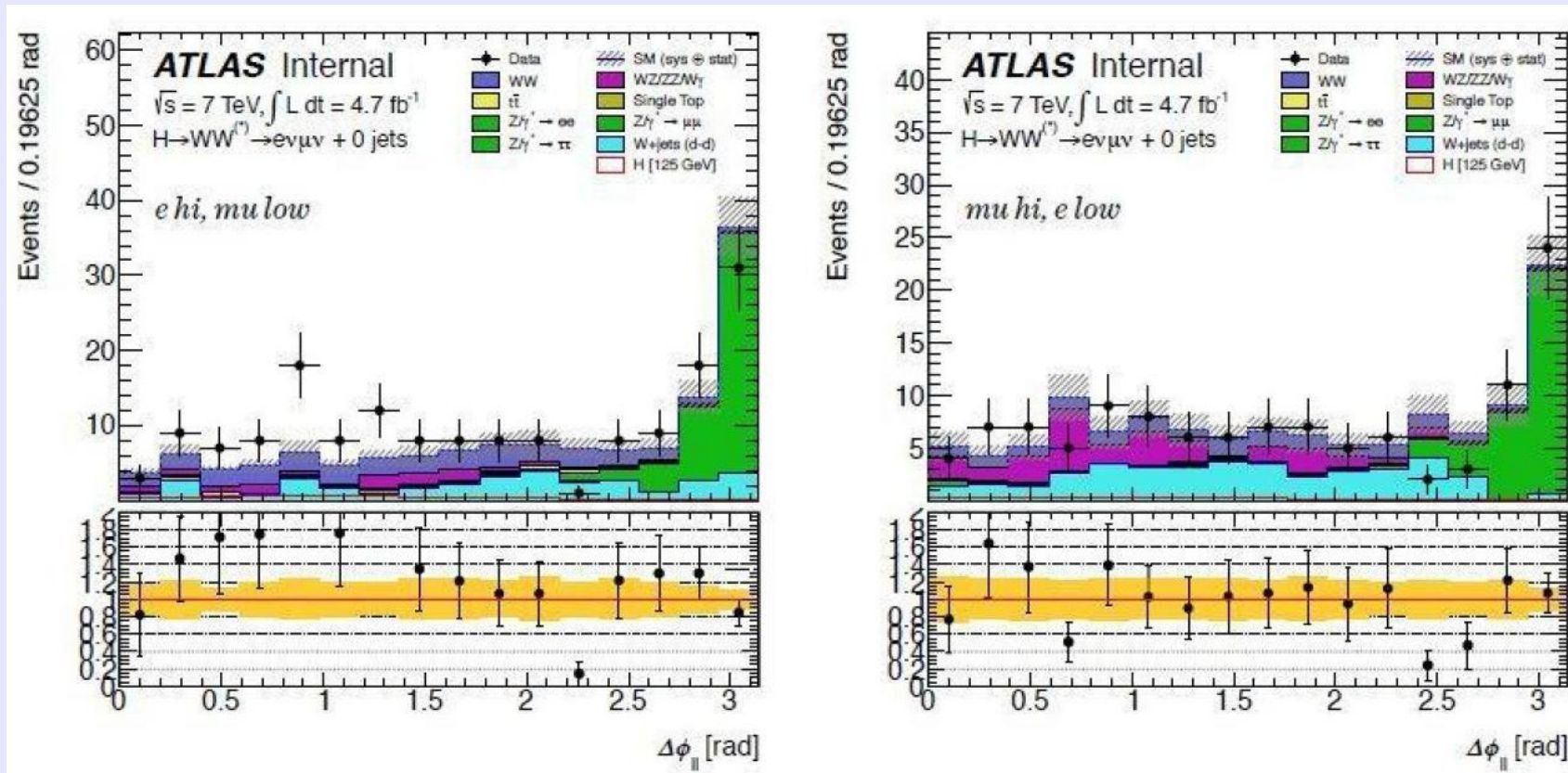
**EXCEPT FOR POINT 1**

# Backup Slides

## Backup Slides

# 2011 Data Excess

- Splitting the e-mu in ehi-mlow and mhi-elow showed that all of the excess is in events with a subleading muon.



Total Excess : 28 +- 12 events (mostly in the eµ channel)

# Flavor Dependence of Excess

The excess in the 2011 data is mostly in the ehi-mulow channel

Cutflow for different flavors

| Lepton channel | ee | $\mu\mu$ | e$\mu$ | all |
|---|---|---|---|---|
| Cut 11 | | | | |
| signal | $2.2 \pm 0.2$ | $5.1 \pm 0.3$ | $13.3 \pm 0.9$ | $20.6 \pm 1.3$ |
| Total Back | $159 \pm 24$ | $271 \pm 33$ | $770 \pm 114$ | $1201 \pm 170$ |
| observed | 144 | 263 | 828 | 1235 |
| Jet Veto | | | | |
| signal | $1.4 \pm 0.1$ | $3.3 \pm 0.3$ | $8.9 \pm 0.8$ | $13.6 \pm 1.2$ |
| Total Back. | $41 \pm 9$ | $80 \pm 15$ | $255 \pm 63$ | $376 \pm 85$ |
| observed | 43 | 81 | 282 | 406 |
| $P_{T,\mu} > 45,30$ GeV | | | | |
| signal | $0.76 \pm 0.08$ | $1.6 \pm 0.2$ | $7.5 \pm 0.7$ | $9.8 \pm 1.9$ |
| Total Back. | $9.7 \pm 3.1$ | $15 \pm 2$ | $90 \pm 10$ | $115 \pm 14$ |
| observed | 6 | 20 | 117 | 143 |
| Final Sample, with $\Delta\Phi < 1.8$ | | | | |
| signal | $8.9 \pm 0.8$ | $0.7 \pm 0.1$ | $1.6 \pm 1.1$ | $6.6 \pm 0.6$ |
| Total Back. | $9.3 \pm 3.0$ | $14.2 \pm 2.3$ | $73 \pm 8$ | $96 \pm 11$ |
| Observed | 5 | **19** | **100** | **124** |

← excess

← excess

No excess in ee, excess in both e$\mu$ and $\mu\mu$